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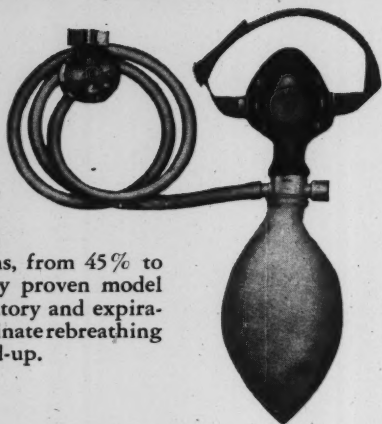
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
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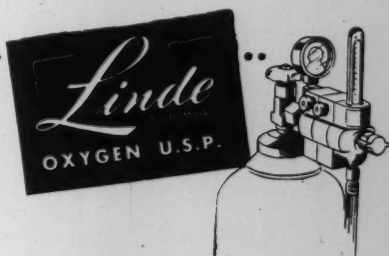
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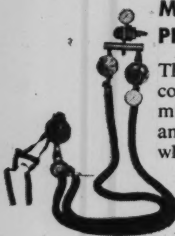




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*"Inhalation Therapy"*

"Inhalation Therapy" is the official publication of the American Association of Inhalation Therapists, an organization of therapy technicians working in hospitals and for firms providing emergency therapy service. The Association is sponsored by the American College of Chest Physicians. Contents include news and information pertinent to the profession including medical research, operative techniques, and practical administration.

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EDITORIAL OFFICE  
260 Crittenden Blvd.  
Rochester 20, New York  
Editor  
JAMES A. WHITACRE  
Managing Editor  
ALBERT CARRIERE

ASSOCIATE EDITORS  
DON E. GILBERT  
M. E. GLASSER  
HENRY J. LA PRAIRIE  
JOHN CROWE  
LAWRENCE E. ROSS  
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ADVERTISING and PRODUCTION OFFICES  
332 South Michigan Ave.  
Chicago 4, Illinois  
Advertising Manager  
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"Inhalation Therapy" is published quarterly by the American Association of Inhalation Therapists at 332 South Michigan, Chicago 4, Illinois. Established in 1956. Single copy \$1.00; subscriptions \$3.00 per year to non-members and \$2.00 per year to members.

## FACING RESPONSIBILITY

The following is an excerpt from the address given by Sister M. Borromea, O.S.F., President of the American Association of Inhalation Therapists at the Annual Meeting held last November.

AS PRESIDENT of the American Association of Inhalation Therapists, I have a feeling of deep concern for the kind of impression which we as members may make upon others. Because I want that impression to be a good one, I want to talk briefly about the standards which we as members of the American Association of Inhalation Therapists should meet.

Now all of us have one common interest, which is inhalation therapy. Surely, it is reasonable to expect that broad ethical principles should apply to the entire membership. It is also reasonable to demand that each one of us should, in his and her professional obligations, be a credit to our association.

If we are deserving and honest, we must admit that as inhalation therapists we have responsibilities of an ethical nature.

First, we have the responsibilities which exist because of our relationship to the persons to whom we administer therapy.

Second, is the responsibility we owe to the other members of our group and to related professional workers.

And third, is our deep obligation to society.

These are not necessarily in the order of their importance; indeed, they cannot be because they are so often intermingled.

However, these obligations imply that therapists must possess unquestionable moral integrity; that they be competently trained so that they are qualified for the efficient and professional performance of their duties.

We must also be certain that we possess the right degree of humility, admitting openly when we are mistaken, or when we do not know. We must never hesitate to seek advice and information from a higher professional authority, particularly where it becomes a matter of the relief of human suffering.

So our relationship with related professions should be tolerant, open-minded, patient and humble. It is not our function to set ourselves on a pedestal, believing

that we are all-knowing and indispensable. Such an attitude defeats the only purpose for which we exist: to provide service which will help relieve human suffering.

As professional people, and members of the American Association of Inhalation Therapists, we cannot obtain the respect of other groups or of the public by being arrogant.

To gain respect we must first earn respect.

There can be no other way.

And so I urge each one of you to do your very best so that no stigma or criticism can attach itself to you as a private citizen, or to you as a professional therapist.

In your professional work, strive to be not merely good—but outstanding.

In your community living, observe the obligations of good citizenship.

And in your relationship to our association, help keep our standards of performance so high that others will look up to us.

Let us look to the future with confidence in ourselves and in our leaders, avoiding petty criticism and personal controversy. If we all work together with a single purpose, the growth and professional maturing of this group, I am sure that none of us will ever have occasion to regret having been a part of the American Association of Inhalation Therapists.

## LOOKING AHEAD

An excerpt from the opening address  
delivered at the 1955 Institute by the Chairman of  
the Board of Directors, Sister M. Rudolpha, O.S.F.

I AM happy, once again, to preside at the opening luncheon of the Institute sponsored by the American Association of Inhalation Therapists.

I am happy that so many of you were able to come to this Institute. It is my hope that we shall continue to hold these annual meetings, and that because of them our influence will increase, and we shall earn not only the respect but the admiration of doctors, hospital administrators, and other professional people.

To accomplish this, I ask that all of us cooperate to the fullest degree with our Board of Directors; that we give all the help we can to our Executive Director. His job is to make our association grow on a national basis, and he will not be able to do this if we are non-cooperative, petty, jealous and opinionated. There are many problems confronting us still. I would not want any of you to get the impression that this association is now an accomplished fact.

We have only begun to scratch the surface. When we consider that we have fewer than four hundred members, and that our potential membership can be estimated in the thousands—then we can readily see how much remains to be accomplished.

But it cannot be accomplished unless we each resolve to do our utmost to help. There are many ways. For example, have you told other people about our association? I do not mean only other therapists, but hospital personnel in other work areas. Why should they not know all about us? Who we are? What our work is? And what we hope to accomplish through this association? They are fully aware of other professional groups, such as Medical Record Librarians, Nursing Anesthetists, etc.

You can also help by getting new members. In her news letter, Sister Borromea asked that each of us get one prospective member to send in an application for membership. Some of us have already done this. But if we all make this effort, we shall, provided the applicant meets our standards, double our membership.

Not only will this be a help financially, but it will help boost our morale. Moreover, it will let others know that we are a growing and dynamic organization.

I have a picture in my mind for the future. Perhaps it is only a dream, but who can tell when dreams become a reality?

I see our association with chapters in principal cities all over the United States and Canada.

I see our membership in the thousands.

I visualize the respect and admiration with which others will regard us.

I see a Journal published regularly by our association, one very much in demand by all persons interested in inhalation therapy.

Other parts of this dream include a complete and competent bibliography, a permanent library containing the best that has been published on inhalation therapy.

Perhaps we shall even get to the place where we have licensing in all states, with uniformly high standards established with the help of our association. And, finally, I see industry looking to us with respect and with a great degree of satisfaction because we are a thoroughly self-supporting, and completely professional association.

These are just some of the dreams for the future of the American Association of Inhalation Therapists. Won't you please join me and the other members of the Board in working hard to help these dreams come true?

## SETTING OUR SIGHTS

*By JAMES F. WHITACRE, Editor*

ONE of the most important objectives of this association is to work with other groups in an effort to raise the professional standards and standing of the Inhalation Therapist. The latter is just as important as the former. In order to be accredited by the American Hospital Association, hospitals must have licensed or registered X-ray technicians, laboratory technicians and physical therapists. How many have Inhalation Therapists with comparable credentials?

What so many hospitals lose sight of is that inhalation therapy is a rapidly advancing field, particularly technically, and that to ensure efficient and effective inhalation therapy it is no longer sufficient to provide merely an orderly to push oxygen cylinders around. A very real need has arisen for a properly trained and qualified inhalation therapist or technician, who not only has intimate knowledge of the latest developments in equipment and techniques available, but also has a sufficiently thorough grounding in cardio-respiratory physiology (and pathology) to know which appliances and methods are most likely to fulfill the physician's orders.

Service should be tailored to the specific needs of the patient, rather than trying to standardize service and make the patient conform to mask, nasal or tent therapy. Too many hospitals do not yet recognize that oxygen is a drug, and too few of them

take the adequate measures to insure its proper administration. It is just as life-saving and important as intravenous therapy, and if wrongly administered can do as much damage as improper I.V. therapy.

From the above evaluation of the prevalent situation, several problems emerge:

1. Hospitals need more and newer equipment, but vastly more important, they need skilled personnel to supervise its operation.
2. Once they have such personnel (who should have salaries and professional standing comparable with other formally trained skilled technicians), they should instruct their staff residents, internes and nurses to respect the judgments and recommendations of these persons — not necessarily to *agree* always, but at least to respect them. The complexity of inhalation therapy equipment and techniques have developed to the point where the average physician does not have the time to master all the technical details. Physicians specializing or particularly interested in inhalation therapy are essential to the inhalation therapist and greatly improve his effectiveness in the hospital.
3. In all fairness to hospital administrators and their staffs, it must be admitted that one of the important reasons for the lack of strong inhalation therapy departments is a scarcity of adequately trained personnel. And this is the part of the problem that *we* must do something about! We cannot expect to have the prestige, the respect, nor the salaries of professionals if we are *not* really professionals. Hence we must seek not only to train new personnel adequately, but should submit *ourselves* for examination too, as soon as standards have been established. I think when we can convince hospital administrators that we are willing to invest time and money in specialized education, they will increasingly hire the better qualified individuals in preference to just anybody. In short, there is not much use crying to administrators about their need for trained personnel (most of them will probably realize this soon) if we are not in a position to fill the bill when they begin to ask for them.

Several things must be accomplished as soon as possible. One is the formulation, approval by the A.M.A., and National adoption by the A.H.A. of a set of standard qualifications for Inhalation Therapists and Inhalation Therapy Technicians. Whether or not we need have standards for two ranks or degrees of advancement (as tentatively indicated by the foregoing titles) can be determined by the A.M.A. or by whoever finally approves the code. But the establishment of these prerequisites will serve as a basis for accreditation or licensing of therapists.

This matter is now being given careful attention by a number of anesthesiologists and chest physicians, who, we hope, will soon come up with a code the A.M.A. will endorse, and then we can begin establishing the training centers where trainees can be prepared for examination and certification or mastery of these standards.

The expansion of membership in A.A.I.T. and formation of local chapters will also go a long way in increasing the opportunities for professional contacts that constantly stimulate and develop the therapist. Furthermore, active participation in such national and local groups confers a desirable mark of professional recognition.

We also feel that these ends will be served by the publication of this journal, which is intended to provide our members and other interested persons all over North America with authoritatively written articles on subjects of importance to those engaged in inhalation therapy work. The journal also affords a means of inter-communication between local chapters and individuals, and thereby gives us a chance to share each other's experiences and observations to everybody's profit.

The Editorial Staff will welcome suggestions, questions and constructive criticisms at any time. This is your Journal, and we are eager to have your participation.

# Organizing an Inhalation Therapy Service

By DON E. GILBERT

**T**HE advantages and benefits to the patient, the hospital, and the medical profession resulting from a well organized inhalation therapy department under the supervision of a trained therapist have been demonstrated and recorded many times (see bibliography).

*Step 1.* The first step in the organization of a department is to get in touch with the doctors who are vitally interested in inhalation therapy and form a temporary committee to evaluate the advantages and problems of such a department in the hospital. One of these doctors could and probably would be, eventually, the head of the department and serve as its clinical adviser.

*Step 2.* Enlist the interest of all department heads and personnel who in the past and present have been responsible for inhalation therapy, i.e. nursing department, orderly department, anesthesia, receiving and delivery department, accounting department. From these sources you should be able to gather such vital statistics as: (a) average number of active cases in a given period of time; (b) close approximation of amount of oxygen and other gases used; (c) types, quantity and quality of equipment now in use; (d) approximate cost of various types of treatment; (e) revenue realized from inhalation therapy; (f) how many, what type, and how expensive were repairs for equipment in the past year; (g) what accidents have occurred in connection with inhalation therapy equipment in the past; (h) what national, local or

insurance safety codes are not being observed at the present time, and (i) what rooms would be available for the department headquarters.

*Step 3.* Obtain approval. With the information obtained from the literature on the subject, the findings of the temporary review committee of doctors, and the results of the aforementioned vital statistics, Step 3 is to present this information to the hospital administration for approval to set up the department.

*Step 4.* Location of the department. The department should be located near the delivery dock or receiving room to minimize the time and expense in the delivery of cylinders and other equipment. It should be kept in mind, however, that it is equally important for the unit to be close to a service elevator so that service is fast and convenient to the patient areas. At least one wall should be an outside one to provide proper ventilation.

Lighting should be considered so that it is adequate for repairs and upkeep of equipment and any book work that will have to be done.

There should be enough floor and wall space and plumbing facilities available for a large, deep, two-bowl sink.

Other physical equipment should include:

1. A workbench and tools for minor repairs and adjustments to therapy apparatus.
2. Desk, chair, filing cabinet and telephone.
3. Storage cabinets or shelves for masks, humidifiers, linen, dressings, oxygen tent canopies, books.
4. Storage racks for pressure regulators.
5. If cylinder oxygen is used there should be space for at least three days' estimated volume.

This article is reprinted by courtesy of "The Modern Hospital" and was originally presented as a paper at the Tri-State Hospital Assembly in Chicago in 1955. Mr. Gilbert is Chief Oxygen Therapist at the University Hospital in Ann Arbor, Michigan, and is a Director of the American Association of Inhalation Therapists.



6. Sufficient space to store large bulky machines such as adult oxygen tents, suction machines, resuscitators, respirators, incubators.

Light switches and electrical outlets should be located 4 feet or more from the floor level. It is also good to keep in mind the fact that cylinders should not be stored near hot steam radiators.

Step 5. On the basis of the list of equipment now in use, and in anticipation of a future increase in the number of active cases, new types of equipment should be ordered to replace that which is obsolete or worn out, or to augment salvage type of equipment. It is best to include also new types of nebulizing, humidifying and pressure breathing equipment.

Step 6. Design all printed record forms so that they coincide in size and placement of information with other similar

printed forms now in use in the hospital.

1. The requisition for inhalation therapy service should include all pertinent information so that the technician can set up and initiate the most effective treatment in a minimum of time and on the right patient. This form should have space for the patient's name, registration number, location, diagnosis, type of therapy desired, the patient's condition at the start of treatment and at the time treatment is discontinued, and a place for the signature of the doctor and nurse.

2. The a.m. equipment inventory form should record the equipment in use and where.

3. A daily record form for technicians should include space for the date and time the patient and equipment were checked; the pressure or amount of gas remaining in the cylinder; the rate of flow; concentration per cent in tents, incubators and hoods; the time when the

OXYGEN THERAPY REQUISITION AND CASE RECORD						
Service <u>Medicine</u>	Class <u>16A</u>	Date <u>7-20-3 Pm</u>	Location <u>6P</u>	Service <u>Med</u>		
Date & Time Started <u>7-20-3 Pm</u>	Dis. <u>7-21-8 Pm</u>					
Type Therapy <u>Adult Tent</u>	Std'by <input type="checkbox"/>	Reg. No. <u>666001</u>				
Indication <u>Coronary Thrombosis</u>		Name <u>Doe, John</u>				
Pt.'s condition at Start <u>Poor</u>		Address <u>CITY</u>				
		Floor <u>6P</u>	Room <u>432</u>	Sheet # <u>1</u>		
Pt's condition when discontinued — Improved <input type="checkbox"/> No Improvement <input type="checkbox"/> R. C. <input type="checkbox"/>						
Signed— Dr. <u>Jones</u>		Nurse <u>Brown</u>				
Above This Line to be Filled in Before Ordering Service						
TO BE FILLED IN BY TECHNICIAN ONLY						
EQUIPMENT INVENTORY						
Regulator # in out <u>109</u>	O <sub>2</sub> tent # in out <u>4-20</u>	Humidifier # in out	BLB oro-nasal OEM pos. press. Nebulizer <u>4-10</u> N.C.B.	BLB nasal OEM Catheter Canopy <u>46</u> Others		
TECHNICIANS DAILY REPORT RECORD						
Date & Time	Am't - O <sub>2</sub>	Flow	Conc. %	Cath. Ch'd	Remarks	Signed
<u>7-20-3 Pm</u>	<u>2X F</u>	<u>12</u>	<u>50</u>		<u>started</u>	<u>NDH</u>

Fig. 1. This oxygen therapy requisition and case record form is a combination of three forms: a requisition for service, an equipment inventory, and a daily record sheet for the technicians. The upper third is filled in by the nurse or doctor who orders the service; the inventory and record are filled in by the technicians.



OXYGEN THERAPY CHARGE TICKET				N <sup>o</sup> 504050	
CHECK (X) ONE		AUTH. BY	DATE	LOCATION	SERVICE
IN PT.	OUT PT.				
<input checked="" type="checkbox"/>		184	7-21-55	LP	med
HELIUM-OXYGEN TANK FULL <input type="checkbox"/> % <input type="checkbox"/> 1/4 <input type="checkbox"/> 1/2 <input type="checkbox"/> CATHETER <input type="checkbox"/> TENT <input checked="" type="checkbox"/> MASK <input type="checkbox"/> INCUBATOR <input type="checkbox"/> NEBULIZER <input type="checkbox"/> STANDBY <input type="checkbox"/>			REQ. NO. 666 001 NAME Doe, John ADDRESS City		
FROM DATE 7-20 TIME 3 P. M. TO DATE 7-21 TIME 8 P. M. TOTAL HRS. 5 DAYS 1			CLASS 16A REV. # 338 AMOUNT # #		
N-222127 UNIVERSITY OF MICHIGAN — UNIVERSITY HOSPITAL					

Fig. 2. The charge ticket is filled out by the head therapist who records the necessary data and then sends the form to the accounting office daily.

catheters were changed; a remarks column for recording when the patient was charged, changes in patient status, and so on, and a space for the technician's signature.

At the University of Michigan Hospital, Ann Arbor, these three forms are included in one form which is called the oxygen therapy requisition and case record form (see Fig. 1). The upper third is filled in by nurse or doctor ordering the service. The inventory and daily record are filled in by the technicians. The original is kept on the floor; the duplicate by the inhalation therapy department.

4. The charge ticket (Fig. 2) should have space for the patient's name, registration number, classification, address, date, time, type of equipment used, and the amount of charges. This ticket is filled out by the head therapist and sent to the accounting office daily for processing.

5. Forms for compiling vital statistics should give at a glance, any kind of information needed regarding the functions of the department in checking its efficiency

and economy. From it one should be able to determine the following points:

a. If charges to the patients are covering the cost of the service, and equally important, whether or not patients are being overcharged.

b. Is the department overstaffed or is there reason for believing that additional help is indicated?

c. In case the hospital may be considering an eventual "bulk storage" or piping of oxygen to some of the areas, the statistics sheet will show which area has the greatest volume.

**Step 7. Personnel.** The actual working head of the department is, of course, a member of the American Association of Inhalation Therapists or one who has had similar training and experience in inhalation therapy. If the hospital is large and will require 24 hour, seven-day service, it will be necessary to hire additional technicians to work nights, week ends, vacations and sick time. These people should be trained thoroughly in the physiology of respiration, theory of inhalation therapy, and safety practices before they

are allowed to assume the responsibility of administering therapy to a patient.

**Step 8.** Determine the charges for service to the patient. At this point again the accounting department can be of great help. The estimated costs should be figured on the various types of anticipated services, i.e. the depreciation of expensive types of equipment and the estimated volume of expendable or "one-time" use of any material (rubber masks, nasal catheters, cleaning materials, paper towels). Although the cost of oxygen itself is minimal in the over-all picture, it should not be disregarded completely. One of the largest items is the labor of setting up, checking, cleaning, servicing, repairing and storing the equipment.

Enough of a margin should be charged to prevent the service from costing more than the revenue that is taken in.

A simple way to charge is on the basis of the time and type of equipment used, prorated to be as fair as possible. For example, one would charge more for an adult tent than for an infant tent and less for eight hours of service than for a complete day.

**Step 9.** Make certain that all departments are aware of how the service will be handled. This can be done by a front office directive to all nursing units and staff members, a report at staff meetings on how the department functions, or a notice in the hospital paper or bulletin.

When all these steps have been taken, the department will be off to a good start.

It will be ideally located, well equipped, the charging system will be economically sound, and well trained therapists will be available to carry out its functions. However, to maintain this high degree of service will require constant checking to see that the equipment is operating at its most effective and safest level. New and better equipment and methods of administration will be found. To keep abreast of these advances, a membership in an organization founded for these purposes would be highly desirable. The better hospital and medical publications should be read routinely and the status of costs and charges should be reviewed to see that they are fair and equitable. Improving and augmenting the functions of the department constantly should be kept in mind with consideration given first to the patient and then to the hospital and the medical staff.

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### NEXT AAIT ANNUAL MEETING

The next annual meeting of the American Association of Inhalation Therapists will be held November 5 to 9 in New York City. An interesting and stimulating program is being planned, and it is hoped that many members as well as non-members will attend.

Details will be announced at a later date.

# HOW WE ORGANIZED THE FLORIDA INHALATION THERAPISTS ASSOCIATION.

By BRUCE BOYD and M. E. GLASSER

**I**N any attempt scientifically to solve a problem, we must first have a clear statement of the known factors, the solution to be achieved and the materials with which these things may be effected. Best to portray the problem and our attempt at its solution, we shall endeavor to set down the several tangible and intangible motives.

Primarily, we must recognize the need for a local chapter. To begin to conceive of some such organization, the absolute need for one quality is unquestionably dominant — and that is determined pride. Determination that Inhalation Therapy and its interesting and beneficial phases are to be one's life work, further determination that the standards and objectives of this work are to be such as to make one proud of this affiliation with the healing arts. Pride that one's efforts will be toward the accomplishment of these objectives, and pride in one's community and fellow workers to make possible the greatest furtherance and dissemination of proper practices and procedures.

Having established these basic qualities, the next problem concerns concentrating our efforts toward realizing these qualities. Initially, one is at a loss as to the proper approach to the many facts involved in setting up a functional organization. In Miami we first established a foothold in our largest hospital. To secure this required the persistent efforts of both our outside service agency and the head of the inhalation therapy department. One of the authors had been in close contact with the Oxygen Therapy Department of Jackson Memorial Hos-

pital. With the cooperation of Mr. Laurence E. Ross, at that time head of this department, they instituted a thorough in-service training program. Extensive use of literature, reprints, lectures, discussions and practical demonstrations served to weld the men in this hospital into a group intensely interested in proper therapy, and even more important, in the probability of establishing this work as a career.

## Promotions

To secure further recognition, we held group discussions with doctors, nurses, attendants, administrators, or with anyone who would listen to oxygen therapy news. We pointed out errors in practice, dangers in improper procedures, and, even more significant, the decided advantages and benefits to be derived from the utilization of good therapy.

Within this hospital a series of in-grade promotions were instituted; men were trained and recognized for their ability. The hospital saw fit to improve and increase the department both as to equipment and personnel. Faith in this program was demonstrated later when the department head resigned to accept a more advanced position, and the administrator was willing to promote the assistant supervisor to the position of department head.

In other hospitals and institutions, the co-author served as personal contact, with innumerable conferences with hospital officials. The significance of our attempt to improve therapy was pointed out in an effort to satisfy doctors, promote the wel-

fare of patients, and effect greater income and savings to hospitals at no additional cost to the patient or the hospital.

Gradually, attendants who were delegated part time to care for oxygen equipment and therapy were further trained and improved in these phases of their work. Doctors, aware of this change, increased their inhalation therapy in hospitals. Administrators found that by concentrating the equipment and efforts in the hands of a few trained people they could obtain far more satisfactory results. Within a few years, many hospital administrators in the Greater Miami Area saw fit to establish oxygen therapy departments, with round the clock coverage. These specialized departments resulted in savings and improved service so that oxygen administration in its many phases was a source of efficient service to all concerned.

Because some of the hospitals found different work load levels in inhalation therapy, it was found most economical to combine the orthopedic work with oxygen therapy. In our community these two services are combined to make possible a full-time department.

It is especially significant to point out that whereas formerly only one local hospital had an Inhalation Therapy Department, at present most large hospitals have one. In the smaller institutions where a separate Therapy Department cannot be supported, a professional oxygen service and its trained technicians offer daily supervision, and, where indicated, twice daily supervision. This co-operation is evident in all our hospitals where the therapist constantly checks equipment, proper usage, patient condition, and where the individual therapist is constantly inquiring of the doctors as to how the service can be improved.

Once we had a group of men interested in inhalation therapy, M. E. Glasser, one of the authors, served as an outside contact man. Mr. L. E. Ross, then Head of the Oxygen Therapy Department in the hospital with the initial organization, served as liaison man within the hospital. The administrators were

approached concerning the formation of an organization whose purpose would be instruction and education. Invariably, this suggestion was enthusiastically received, and the hospitals offered the group facilities for meeting regularly.

### First Meeting

Our first meeting was held at Jackson Memorial Hospital on April 16, 1955. At this meeting, M. E. Glasser described the reasons for having an organization, its advantages to ourselves as a professional group and to the hospitals and their patients. A slate of officers was elected, a name chosen, and the Florida Inhalation Therapists Association was born.

To bring our group before hospital administrators and other interested individuals, we solicited the efforts of all the local manufacturers. One of our first meetings was held at the local National Cylinder Gas plant. It was a gala event, every hospital was represented; interested administrators, nurses and other personnel were present. Through the efforts of our hosts, an interesting program and plant tour was arranged, the evening topped off with refreshments.

Through the cooperation of the American Association of Inhalation Therapists, a copy of the National charter and by-laws was obtained from which our group formulated its own charter and by-laws.

By the combined efforts of our President and the national association, our group was able to establish a foundation on which to build a progressive organization. It is indeed with pride that we point to the fact that in our first six months of operation, all therapists in hospitals of sufficient size to support a separate oxygen therapy department are members of the organization. And every hospital administrator has approved our program.

At present, our organization is progressing most satisfactorily. We meet once a month. Notices of meetings are mailed to each hospital administrator and Oxygen Therapy Department. A committee, consisting of our President and a hospital therapist, contacts two members of the medical staff of each hospital to

present a program, and to arrange for a meeting place. Each month we use a different hospital, and once every fourth or fifth month we schedule a business meeting.

We have our own printed stationery for sending communications, a good way to keep the Florida Inhalation Therapists before the eyes of those who can best help the Association. We issue a certificate to members in good standing for attendance during the year, and we have our own identification pins which each man wears while working to get further recognition for our group.

Perhaps the best indication of the success of our efforts is the fact that this

past year both our President and Secretary attended the annual meeting held by the American Association of Inhalation Therapists, and that nearly half of our members have joined the national group.

### **AAIT Chapter**

We look forward to continued activity and recognition. We anticipate being the first local chapter in the national association. But most of all, we are anxious to enhance inhalation therapy. Our literature, library, lectures, demonstrations and other projects are based solely upon our mutual desire to further our best interests by increasing our service and value to the medical profession and mankind.

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## **AMONG OUR CONTRIBUTORS**

A member of the AAIT Advisory Board, **Dr. Albert H. Andrews, Jr.**, is on the staff of Children's Memorial Hospital and St. Luke's Hospital of Chicago. He directs the Respiration Research Laboratory at St. Luke's. He is a Fellow of the American College of Chest Physicians, Chairman of the Committee on Physiologic Treatment, and also Assistant Clinical Professor of bronchoesophagology at the University of Illinois College of Medicine.

**Bruce Boyd**, who collaborated with M. E. Glasser on the Florida Association's story, is Head of the Oxygen Therapy Department at Jackson Memorial Hospital, Miami, Florida.

**Sister M. Borromea, OSF**, President of the American Association of Inhalation Therapists, is the Superior and Administrator of St. Francis Hospital, Escanaba, Michigan.

**Don E. Gilbert**, who makes two contributions to this publication, is a member of the Board of Directors. He is Chief Oxygen Therapist at University of Michigan Hospital, Ann Arbor, Michigan.

**M. E. Glasser**, co-author with Bruce Boyd of the article describing the origin of the Florida Inhalation Therapy Association, is the Manager of Professional Oxygen Service, Miami, Florida.

**Lemuel B. Line**, who designed our cover, is one of America's outstandingly talented free-lance artists. A graduate of Dickinson College and the Philadelphia Institute of Art and Design, Mr. Line is best known for his illustrations of ships, trucks, trains and earth-moving machinery which appear periodically in "Fortune Magazine."

**Sister M. Rudolpha, OSF**, is Chairman of the AAIT Board of Trustees, and conducts a School for Anesthetists at St. John's Hospital in Springfield, Illinois.

**James F. Whitacre**, Chairman of the Editorial Committee of the AAIT Journal, has a Master of Science degree in Physiology from the University of Rochester. After a teaching stint at Mt. Holyoke College, he became the Supervisor of Inhalation Therapy at Strong Memorial Hospital of the University of Rochester.

## Know Your Directors



Sister M. Borromea, OSF  
President: AAIT  
Superior and Administrator  
St. Francis Hospital  
Escanaba, Michigan



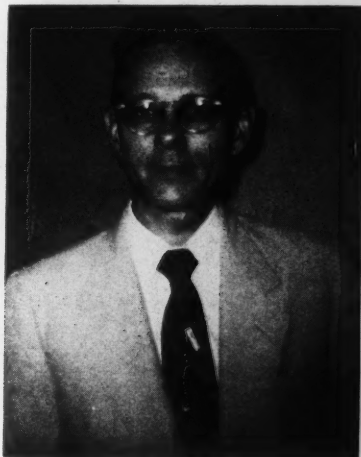
Sister M. Yvonne, RN, BS  
Board Member AAIT  
Director of Anesthesia  
St. Francis Hospital  
La Crosse, Wisconsin

*In each of the first four issues of Inhalation Therapy it is planned to show pictures of some of the Officers or Directors to enable the members to become familiar with these leaders.*

James E. Peo, RN  
Board Member AAIT  
Inhalation Therapist  
Delaware Hospital  
Wilmington, Delaware



Don E. Gilbert  
Board Member AAIT  
Chief Therapist  
Oxygen Therapy Department  
University of Michigan Hospital  
Ann Arbor, Michigan





# HUMIDITY AND GAS THERAPY

By ALBERT H. ANDREWS, JR., M.D.\*

Inspired air is conditioned for the lungs in three ways: first, cleansed; second, warmed, and third, humidified. The latter function is performed to great extent, although not completely, by the nose. We are well aware of the dryness of the mouth and throat which follows prolonged mouth breathing. When the air is dry, a greater load is placed on the nose in respect to this function. When the air is inadequately humidified, drying of the secretions in the trachea and bronchi occurs and results in increased difficulty in expelling the secretions. In certain types of infections, particularly croup or acute laryngotracheobronchitis, the secretions are thick and sticky and accumulate in the tracheobronchial tree. Increased humidity helps to liquify the secretions and aids their expulsion.

Tracheotomized patients require a high humidity following surgery because the air conditioning function of the nose is absent. The smaller the patient, the more essential is the high humidity. Inadequate humidity causes drying and retention of the bronchial secretions. Crusts are formed and serious respiratory obstruction follows in spite of irrigation and aspiration through the tracheotomy tube.

The amount of water vapor in the air is expressed as relative humidity and indicates the percentage of the total amount of water vapor which the air can hold at any particular temperature. Relative humidity may be measured by several different means. The most frequently used is the wet and dry bulb thermometer. The wet bulb thermometer is fanned vigorously until the tempera-

ture reaches its lowest point. Then, by reference to a table supplied with the apparatus, the relative humidity is determined. If the wet bulb is not fanned vigorously, the readings are erroneous. The ordinary direct reading humidity gauge is usually inaccurate and unreliable for measurement of the high therapeutic humidity.

Humidity therapy may be divided into three types. First, "normal"; second, "therapeutic," and third, "fog" therapy. Normal humidity is the optimum for healthful conditions and is between 40 and 60 percent. Therapeutic humidity is for the purpose of treatment and should be as close to 100 percent as possible. Heat loss by evaporation is markedly reduced by such high humidity so the temperature must be maintained below 80°F. or better still, below 75°F., except in special circumstances.

## Normal Humidity

Many types of humidifiers are available for producing relative humidities of 40 to 50 percent or even to 60 percent. These include evaporator types, mechanical types and tanks on furnaces. Hot plates, moist towels and radiator tanks may be used.

## Therapeutic Humidity

Relative humidity should be extremely high, but without excessive temperature. Heat type humidifiers are unsatisfactory for this purpose. A mechanical humidifier, such as the Walton, blows fine particles of water into the air and is satisfactory for this purpose.

**High Humidity Room:** A small room is selected and the drapes removed. If it is to be used for prolonged periods of

\*Doctor Andrews is Director of the Respiration Laboratory at St. Luke's Hospital, Chicago, Illinois.



time, special waterproof covering for the walls, ceiling, and floors should be supplied in order to prevent deterioration of the plaster. One or more mechanical humidifiers may be placed in the room. Built-in humidifiers may be used with automatic water supply. Recently a system has been developed for using heat to supply the humidity and then cooling the air before it enters the room. In this way a high humidity is produced without the extreme disadvantage of the high temperature.

**Croup Tent:** The modern croup tent consists of sheets draped over the bed or crib and over a mechanical humidifier. One hundred percent relative humidity at room temperature is produced. An oxygen tent canopy may be used.

### **Oxygen and Humidity Therapy**

This combination is used when both types of therapy are indicated and may be achieved as described below.

**Oxygen catheter:** The humidity in the room is raised as described by the methods above, or the patient is placed in a modern croup tent. It is assumed that an oxygen humidifier with efficient diffusion head (not just a bubbling bottle) or aerosol mechanism is always used with the catheter.

**Oxygen mask:** Masks of the BLB type and of the Meter type with water in the metering device produce a satisfactory normal humidity. When excessive oxygen flows are used, that is, when the bag is kept almost completely filled all the time, this normal humidity is lost. An oxygen humidifier of the type used for oxygen catheter therapy raises the humidity to therapeutic levels.

**Oxygen tent:** Certain recently developed oxygen tents supply high humidity. Aerosol generators, splashing devices and heaters with coolers are methods used for producing the high humidity. The Hospital Model of the Walton Humidifier may be used. It is extremely important to exercise the usual fire preventative measures when using a humidifier with oxygen tents. First, ascertain that the

design of the humidifier is safe for use with oxygen, and second, that the instrument, wires, and switches are in perfect condition.

### **Water Aerosol**

The inhalation of water aerosol results in the water particles being deposited within the airways. The smaller the particles, the farther down the tracheobronchial tree they travel before depositing on the walls. The particles then penetrate the secretions and contribute to the liquefaction. This penetrating action may be aided by the use of wetting agents in the aerosol.

### **Aerosol Generators**

Aerosol generators are atomizers usually activated by oxygen or compressed air. The instruments are supplied with a means for precipitating large particles so that only the small particles are delivered to the patient. The aerosol may be administered by mask, face piece, face tent, or tracheotomy mask and in an enclosure such as a croup tent, oxygen tent, or high humidity room. The criteria of effective administration is the presence of the visible fog.



Dr. A. H. Andrews, Jr.

# AAIT PROGRESS . . .

*. . . slow but sure*

By DON E. GILBERT

**M**EDICAL progress during the past two decades has made necessary the development of educational standards and the mastery of certain techniques on the part of non-medical personnel. Inhalation therapy is one of the specialties where the need for high quality work is greatest.

Nine years ago a few men in the city of Chicago started thinking in terms of an association dedicated to these objectives:

1. To encourage and develop educational programs for those persons interested in the field of inhalation therapy.
2. To advance the science and art of inhalational therapy through institutes, meetings, lectures, and the printing and distribution of a journal.
3. To aid in the advancement of the technical aspects of inhalation therapy.
4. To facilitate cooperation between inhalation therapists and the medical profession, hospitals and other agencies interested in inhalation therapy.

Then in 1950 the first Institute was held in Chicago, Illinois. Though its attendance was not large, the interest in and need for such an association was clearly demonstrated by the wide geographical area represented.

After several years of attempting to run the Association on a part-time basis with volunteers from among the membership, it was decided that the organization and development of a group with such tremendous potential for growth was a full-time job.

In May of 1955, the Advisory Board recommended the employment of an Executive Director so that the American Association of Inhalation Therapists could be operated efficiently and in a thoroughly professional manner.

After serious deliberation, the Advisory Board recommended that the public relations firm of Carriere and Jobson, Inc., a New York and Chicago company, be appointed counsel for the American Association of Inhalation Therapists. It further recommended that Mr. Albert Carriere, President of Carriere and Jobson, Inc., be asked to take over the duties of Executive Director by whom the business of the Association would be handled.

This arrangement led to the sponsorship of the American Association of Inhalation Therapists by the American College of Chest Physicians.

To provide a national headquarters for the Association, Carriere and Jobson, Inc., made available its attractive offices in the McCormick Building, Room 904, 332 S. Michigan Ave., Chicago, Illinois.

The choice of both the company and the man proved fortunate. From November 7 through 11, 1955, the sixth Institute was held, attended by 115 people, representing hospitals and businesses of inhalation therapy from 21 states and from Canada.

We can now be proud of a membership of more than 400.

In this, the first issue of our journal, we can look at a dream of long standing come true. And we can also look ahead to the many projects to be completed in the near future:

1. The establishment of professional standards.
2. An association bibliography.
3. Establishing training schools.
4. A placement bureau.
5. A speaker's bureau.
6. Formation of regional, state and local groups.
7. Licensing and accreditation.

As the proverb says, "Many hands make light work." Our goal, then, is at least 1000 members by the end of 1956.

# NATIONALLY KNOWN MEDICAL MEN SPEAK AT SIXTH INSTITUTE

By JAMES F. WHITACRE

The Sixth Annual Institute of the American Association of Inhalation Therapists was held at the St. Clair Hotel in Chicago, November 7-11, 1955. The Institute is rather more than the conventions held by many professional organizations, in that it includes not only business sessions, exhibits and papers by members or visitors, but also has a course of lectures covering fundamentals for newcomers to the field and refresher material for the old guard.

The program opened Monday morning, November 7th, with registration followed by an orientation meeting for new students and non-members. Introductory remarks by Miss Dorothy Braeger, R.N., of the Board of Directors, gave information on the background and aims of the AAIT. She then introduced Dr. Edwin R. Levine, who conveyed the official greetings of the American College of Chest Physicians, and explained what a hard struggle it was to get the sponsorship of this body. Evidently during the two years we were endeavoring to get it, several other organizations have also sought their professional backing, but it has been awarded to us only.

## Effective Therapy

Dr. Levine went on to discuss the place of inhalation therapy and therapists in hospitals today, and gave some of his ideas about how to make it most effective. (He is the author of the book "Effective Inhalation Therapy," published in 1954, which is now a standard reference of therapists.) He pointed out

that the day of independent individuals is gone: all people in medicine are so interdependent on each other that *all* links in the chain must be strong. This means doctors and administrators must give therapists a place in the sun, instead of continuing to feel they can manage without inhalation therapists, or without paying them enough to get anybody but incompetents. "The doctor must realize that once he prescribes inhalation therapy of a given form, he should be able to leave the rest up to us and depend on us to execute it in a better fashion than he could, because of the fact that we have specialized knowledge and equipment he hasn't the time to master." He feels that we must continually work to improve our own education, and tactfully to improve that of the doctors we work with too, whenever new equipment or techniques come into the field.

Economy was given as one of the greatest arguing points for hospitals' setting up separate departments of inhalation therapy. Keeping track of all equipment, maintenance, operating costs, charges to patients, etc., in the long run results in less cost to the institution than expense incurred where inhalation therapy is an orphan child and has to have help from one or more other departments. Also, the quality of service rendered goes up a lot. The department should be professionally headed, and if possible staffed around the clock, to minimize mis-handling of expensive and complex equipment by untrained internes, nurses and orderlies. "Inhalation

Therapy is too important to be handled on a part-time basis."

This was followed by a luncheon meeting at which Sister Rudolph, the Chairman of the Board of Directors, welcomed the gathering and described some of the accomplishments during the preceding summer effected by Mr. Carriere in improving the status of the AAIT. She dwelt upon the importance of our membership drive in strengthening the association, and gave an optimistic outlook for the future.\*

The short afternoon session was devoted to two papers, presented by Mr. James Peo and Mr. Don Gilbert, both members of the Board of Directors. Mr. Peo spoke on the incorporation of inhalation therapy instruction in the education program of student nurses, as developed and practiced in the Delaware Hospital (Wilmington, Del.) where he is supervisor of inhalation therapy. He described in some detail the schedule of formal and informal classes, demonstrations, reading syllabi and quizzes used to ensure that each nurse emerges well qualified to handle inhalation therapy equipment, and to interpret and execute doctors' orders for it.

Mr. Gilbert discussed the advantages and importance of records and statistics in the operation of a department of inhalation therapy, illustrating his talk with examples of some of the forms used by his own department at the University of Michigan Hospital in Ann Arbor.

Each paper was followed by an informal question and discussion period. After these, the exhibits were open for all who were not occupied in committee meetings the rest of the afternoon.

Monday night, the Pulmonary Physiology Laboratory of the U. of Illinois Research Hospital held an open house for AAIT members. Dr. George Saxton and Mr. Gareth Gish were hosts. The guests were shown how polio patients are managed without respirators, by means of intermittent positive pressure breathing via their tracheotomy tubes, and various other equipment was demonstrated in use.

## Polio Problems

Tuesday morning, November 8th, opened the formal lecture course with Dr. Saxton speaking on "Inhalation Problems of the Polio Patient." Space does not permit going into full details of his lecture here. These details, and those of all the rest of the lectures and proceedings, will be available in mimeographed form from the AAIT at cost. In brief, Dr. Saxton's lecture was divided into two portions. The first was concerned chiefly with pulmonary function, and the theoretical concepts of ventilation, distribution of inspired air, gas diffusion (especially getting rid of  $\text{CO}_2$ ), and circulation or perfusion were carefully considered. After the mid-morning break, the second half of the session was devoted to more practical aspects of the management of inhalation therapy problems of polio patients. Attention was called to some of the dangers associated with oxygen therapy, such as  $\text{CO}_2$  retention, secretions in airway causing atelectasis in presence of 100%  $\text{O}_2$ , poisoning of central nervous system enzymes by over-oxygenation, etc. Then there was an account of various types of respirators and techniques used with them. The enthusiastic discussion following the session had to be broken off in order to get to the dining room in time.

Tuesday's luncheon meeting featured a talk by Dr. Max Sadove on "Resuscitation Do's and Don'ts," in which he asserted that many of the deaths from unexpected cardiac arrests while patients are in X-Ray, en route to and from recovery rooms, clinics, in hall's or elevators, etc. could be prevented if only hospitals had better organization of the resuscitation equipment and better training of the personnel as to where it is and how to use it promptly. Personnel must be taught to recognize the need and to go at once to nearest equipment and employ it directly. Equipment should be available wherever there are likely to be patients—not just in operating or recovery rooms. This does not mean each patient division must have a six or seven hundred dollar resuscitator, but *some* means, how-

ever simple, should be provided. What would probably be considered as adequate would be an airway and a source of oxygen with an anesthesia type mask. He went on to give some cautions in the use of resuscitative equipment, of which, two of outstanding importance are to guard against obstructed airways, and not to use Alevaire where there is pulmonary edema, as it increases froth in lungs and makes patient worse.

Tuesday afternoon was devoted to meetings of the Board of Directors and Advisory Board and various committee meetings. Exhibits were open for those free to attend. Tuesday evening was also open.

### **Humidity**

Wednesday, November 9th, there were two morning sessions. The first, given by Dr. Albert Andrews and Dr. Edwin Levine, was on "Humidity in Inhalation Therapy." Interpretation of terminology used in discussions on humidity was followed by description of the humidity conditions, and factors affecting them, in the different parts of the respiratory tract. Results of drying or low humidity were enumerated. Means of measuring the rela-

tive humidity were evaluated, and different types of equipment for raising the humidity were described, and their relative effectiveness under various conditions discussed. The session was closed with consideration of the types of patients who need high humidity therapy.

The second session that morning was, "Special Problems of the Patient with a Tracheotomy," presented by Dr. Andrews, who told what the full significance of the tracheotomy is to a patient in terms of loss of warming, filtering, humidification, etc. He gave reasons why tracheotomies should be done, how and where the tracheotomy should be placed, and went into considerable detail regarding the careful humidification and other measures necessary to avoid difficulties with the tracheotomy.

That noon, the luncheon roundtable was addressed by Dr. Paul Searles, on the topic, "The Problem of the Patient in Shock—Postoperative and Traumatic." Dr. Searles described the events of primary and of secondary shock in general before considering shock found after operations as opposed to that following accidents, burns, etc. One of the interesting points he brought out, which is unfortunately

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Executive Director  
American Association of  
Inhalation Therapists  
332 South Michigan Ave.  
Chicago 4, Ill.**

not sufficiently widely appreciated, is that whereas Trendelenburg position and Levophed or other vasopressor drugs are of considerable benefit during primary shock, once a patient passes into the peripheral vascular collapse of secondary shock neither of these measures is effective, and in fact the patient does better without them. Vastly more important than either in cases in this stage is the maintenance of patent airway and ventilation adequate to get rid of  $\text{CO}_2$ .

Wednesday afternoon was devoted to the place of audio-visual aids in inhalation therapy education programs, and featured training films made by the Linde Air Products Company ("Oxygen Dosage and Techniques") and the Ohio Chemical & Surgical Equipment Company ("Purpose and Techniques of Oxygen Therapy"). Figures from a Navy survey, stating that students if motivated and trained with visual aids will learn 35% more than control groups and retain it 55% longer, were given. It was concluded that these might be a little high for civilian training programs, but that it was certainly indicative of the success of such methods. Steps in the utilization of a visual aid to best advantage were discussed. These were first to examine the aid carefully alone beforehand, next to motivate the class by telling them about it and getting them interested. Then present the film. It should be followed by a quiz or some other opportunity to use the information the students have just been given. It is felt that this participation along with the motivation, approximately double the value of the film in terms of amount of material learned and length of time it is retained.

### Open House

Wednesday night, Dr. Albert Andrews held open house in his nationally famous testing laboratory at St. Luke's Hospital, where we were shown some of his extensive and complex analyzers and testing devices. Dr. Andrews explained why and how they are used, and showed sample records and discussed the information they reveal, and its significance in

evaluating the efficacy of a given piece of equipment, or of the way in which that equipment is being used. For example, he not only analyzes efficiency of oxygen tents, but also can show what differences in results are obtained with the same tent if different techniques are employed, such as the way in which the canopy is tucked in, whether or not rubber sheets are used under the linen, etc. Dr. Andrews' lab also conducts a lot of pulmonary function tests, and we were shown much of the apparatus used for these, and some of the procedures were demonstrated.

The first session Thursday morning, November 10th, was on "New Developments in Aerosol Therapy," and given by Drs. Sadove and Levine. A film on Aerosol Therapy made by Winthrop-Stearns Company under Dr. Sadove's direction was shown first. This was followed by a detailed discussion of aerosol particle size, use and mode of action of detergents, conditions where aerosol therapy is indicated, apparatus for generating suitable "cigarette smoke" fog, etc. Included was a special consideration of different bronchodilators, indication for their use, where and how to use the different ones in conjunction with water, detergent and antibiotic aerosols. The enzyme aerosols were condemned as too dangerous at this time, because the incidence of untoward side reactions is too high in proportion to the good they do.

After a break, Thursday's second morning session, on "Anti-Foaming Agents," was given by the same two doctors. This, as can be imagined from the title, was primarily a discussion of management of the patient in severe pulmonary edema, whose lungs are full of frothy secretions that are blocking the gas exchange across the alveolar walls. In this case, it is not so much liquefaction of secretions that is sought as it is a matter of getting rid of the foam that is blocking the lower reaches of the respiratory tree.

In these doctors' opinion, *all* patients in pulmonary edema require oxygen in high concentration. But oxygen alone is often not enough, because of itself it



does not reduce the froth. Any treatment that will open the bronchi and alveoli is life-saving, but does not cure the pulmonary edema. Inhalation therapy can sustain the patient, however, until medical means can get at the underlying cause. The inhalation therapy regimen they advise is use of ethyl alcohol—preferably 5 or 10% by aerosol, and the method of choice is by intermittent positive pressure breathing with a mask and oxygen. If such apparatus is not available, about 50% alcohol may be used in a catheter type humidifier with oxygen, the amount of alcohol getting over to the patient being less by this route. Care must be taken because high concentrations of alcohol are irritating to the bronchial mucosa, and also over a period of time the patient may become intoxicated if too much alcohol is given. Furthermore, alcohol fumes plus oxygen constitute an increased fire hazard.

By whatever route, the rationale of therapy with alcohol is that its lower sur-

face tension breaks the bubbles and reduces the foaming of the secretions, with dramatic relief to the patient. The doctors feel that this treatment should be continued for about a half hour at a time every 3 or 4 hours, and in between the patient should continue to receive oxygen. Their parting shot was that suddenly discontinuing oxygen therapy without tapering off is definitely hard on the cardio-respiratory system of the patient, and adds an unnecessary strain which should be avoided by the tapering-off technique.

### Low Concentration

Dr. Andrews spoke on "Low Concentration Oxygen Therapy" at the luncheon meeting that day. Low concentrations of oxygen—30-40%, as opposed to 50% or over—are most important in emphysema patients and premature babies, to prevent retrolental fibroplasia. He described a technique for getting emphysematous patients with CO<sub>2</sub> retention oxygenated

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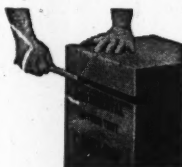
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gradually by starting with 1 liter/minute nasal  $O_2$  and increasing flow rate by 1 liter each day till 7 is reached. Doing it gradually, the respiratory center and the carotid body-chemoreceptors have opportunity to become adapted to the higher partial pressures of oxygen, and therefore do not cause the suppression of breathing which occurs commonly if an anoxic emphysematous person is put directly on oxygen at 7 liters/minute.

He emphasized the need for special flowmeters with greater accuracy in the 1 to 4-liter/minute range, and for back pressure compensated flowmeters, in order that low concentration therapy can be effectively carried out. The average flowmeter, which has neither of the above desirable characteristics, is not well suited to this form of therapy.

Dr. Andrews feels that the "dangerous uncontrolled enthusiasm" about using 40% or lower concentrations on premature babies regardless of their condition, in order to prevent RLF, is overdone. He feels, and very sensibly, we think, that a live blind baby is better than a dead one, and if the baby is still blue in 40% oxygen, it should be given 60, 80 or even 100% oxygen for at least long enough to see if the cyanosis can be relieved. The concentration should of course be reduced to a more modest figure as soon as possible, but care must be taken to allow sufficient time for tapering off the concentration, as this is very important. Many pediatricians now feel that sudden changes in oxygen concentration are even more dangerously predisposing to RLF than is a steady high concentration.

The annual business meeting of the AAIT was on Thursday afternoon. Sister Borromea, the president, gave an inspiring address about the moral and ethical standards, as well as the educational ones which AAIT members should strive to uphold, in order always to be a credit to the AAIT. She stressed humility: we should always be willing to admit mistakes and/or to ask for help. It is better to avoid petty criticisms and devote the time instead to constant attempts to improve quality of service we render.

Sister Borromea's address was followed by reports of the Treasurer and the Executive Director, and by the standing committees. The rest of the afternoon and evening were free for perusal of exhibits.

### Pressure Breathing

Friday morning, November 11th, Dr. Andrews and Dr. Levine took up the topic of "Recent Developments in Pressure Breathing." They covered intermittent positive pressure breathing, when to use it, capabilities of different apparatuses available, proper application of equipment, timing of treatments and coordination with other medications in the patient's therapeutic program, and contraindications to its use. Examples of about four different commercially available instruments were demonstrated by the doctors in the course of the presentation.

The theory, techniques and indications for the use of exsufflation with negative pressure (popularly known as "cough machine") was also presented. In connection with this, there was shown part of a Ciba Foundation film which showed some of Dr. Alvan Barach's various developmental apparatuses evolved during his pioneering researches in this field.

The enthusiastic response, questions and discussion, demonstrations and film presentation made this session extend overtime to the extent we had to hold the following session on Mask Therapy by Dr. Levine at the luncheon meeting before Dr. Andrews' talk on "What Can Be Expected of Oxygen Tents." Dr. Levine outlined the types of masks in common use today, and gave brief comments about their relative advantages and disadvantages which enable a person to select the one of choice for a given condition-patient situation.

Dr. Andrews considered the aspects of oxygen and  $CO_2$  concentrations, temperature and relative humidity as obtained in currently available oxygen tents. Despite manufacturers' claims, he asserts that 45 to 50% is very good for even new tents. Sixty-five percent can be obtained,

# There wasn't a moment's hesitation...

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of hospital administrators throughout  
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to rely on the name Puritan . . .

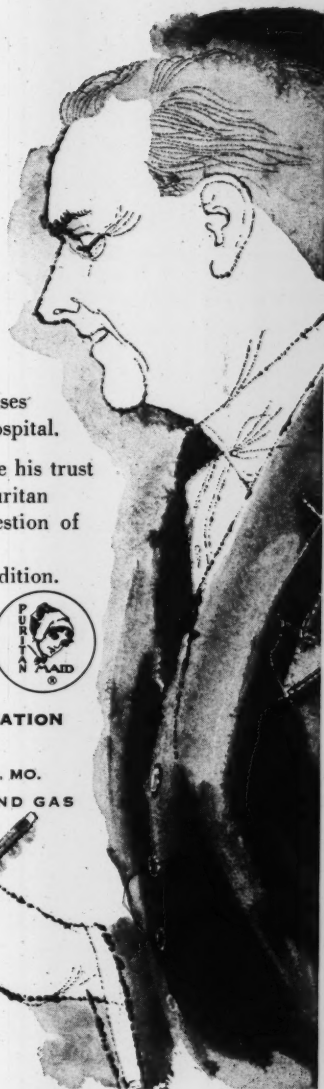
And he didn't hesitate for a moment  
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"but only under impossibly strict operating conditions." It should be pointed out that he is talking here of *average* concentrations, which may be made up of higher and lower ones over a period of time. He made the further important point that most oxygen analyses really mean very little, because they only give an instantaneous value, which usually does not at all accurately portray the average conditions, and in fact misleads the clinician into thinking the concentration is always about what the analysis says. The ideal but of course economically impossible solution, is that of continuously recording analyses, like those Dr. Andrews makes in his laboratory. The best most of us can do is try to make several analyses a day and regard them for exactly what they are worth, and not try to assume what has gone on in between!

Another thing he pointed out is that usually the higher the  $O_2$  concentration is, the higher is that of  $CO_2$  also. The

reason is extremely logical: if the seal is good enough to keep in enough  $O_2$  to build up high concentrations, it also retains  $CO_2$ ! He considers the maximum allowable  $CO_2$  concentration in a tent is 2%, and that 1% is much better. Tents operated at about 10 l pm with a resulting oxygen concentration of about 50% usually have about 1%  $CO_2$  concentration. A higher liter flow of oxygen, while it often does not raise oxygen concentration much more, does help lower  $CO_2$  concentration by washing it out of the tent.

This was the end of the formal lecture series, and an examination was given that afternoon. The foregoing resume is of necessity considerably abbreviated; for a complete account of all proceedings, the reader is referred, as before mentioned, to the full transcription taken from the tape recordings made of each session by Mr. Gareth Gish. Copies of this transcription will be available at cost from the AAIT.

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## INHALATION THERAPY ABSTRACTS

"Clinical Test for Pulmonary Congestion with Use of Valsalva Manoeuvre," by Knowles, Gorlin & Storey, JAMA 160:44 (7 Jan 56)

The Valsalva experiment is a forced expiratory effort against a closed glottis or suitable external block in the airway. The normal response to this is a sudden increase in arterial blood pressure, which falls to a relatively steady low point within a few seconds afterwards.

These blood pressure changes are strikingly different in patients with pulmonary congestion, such as would occur in mitral stenosis or left ventricular failure. In such patients, the time taken for the pressure to fall from its initial rise is characteristically delayed or fails to occur at all. There are other differences also.

These authors are borne out in their findings by an independent investigation by Sharpey-Schafer in England which was just reported in Brit. J. Med. 1:693, 1955.

"Cantilever Pneumograph," by Dr. William J. Whalen, Rev. Sci. Inst. 26:1073 (Nov 55).

The Dept. of Physiology of the U. of California Medical Center (Los Angeles) has developed a pneumograph for use in pulmonary physiology experimentation and function testing. The traditional pneumographs have depended on a length of hose tied around the thorax, and changes in gas volume of the tube occasioned by respiratory movements were transmitted to a lever writing on a

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moving drum. This method was fraught with inconveniences and was of very poor accuracy at best.

Dr. Whalen's device overcomes these difficulties by replacing the hose with an instrument composed of an aluminum beam connected to a leaf of spring steel on which are mounted the strain gauge transducers. The other end of the steel leaf is fastened into a hollow lucite rod containing wires leading to control unit.

In use, the aluminum rod is laid on abdomen or thorax, as desired, with slight pressure, and the electrical impulses developed by the strain gauges are fed to any d.c. amplifying and recording system. Authors state cost of instrument and control unit was only \$10.

"Physical Dynamics of the Cough Mechanism," by Ross, Gramiak & Rahn, *J. Appl. Physiol.* 8:264 (Nov 55).

These investigators made a very interesting X-ray moving picture study of the trachea during coughing. It was coupled

with simultaneous records of air flow in the trachea and pressures in the esophagus (reflecting intrapleural pressure changes).

They made serial measurements of the upper bronchial tree as shown on consecutive frames of the movie of patients with Lipiodol in their lungs, and these measurements did not show any sequential narrowing of bronchial and tracheal walls during coughing, as has been frequently postulated, but rather a simultaneous narrowing of all the walls.

Tests were made using a Coflator too, and these showed that this machine is capable of producing expiratory volume flows of about 6 l/sec., which is about what a normal cough produces. The Coflator and similar machines, however, do not produce the linear velocity of expiratory air flow that is achieved in a normal cough, and this is because they do not narrow the passages as they are narrowed during the natural process.

These authors find this linear velocity as important a factor in an effective cough as the volume rate of flow, and that is why the cough machines of the type now available cannot begin to achieve a cough as effective as a natural one.

The velocities of expiratory air flow are not without interest in themselves. During normal expiration, according to their calculations, the linear velocity of the expired air is about equivalent to a 15 mph wind, while that developed during a Coflator cough (producing 7 l/sec. flow) in an uncompressed trachea is about 100 mph, or hurricane velocity. During a normal cough, however, wherein the lumina of the trachea and bronchi are narrowed simultaneously with the blast of expired air, linear velocities of air flow reach about 85% of the speed of sound!

These figures should remove some of the temerity many of us have felt about using cough machines, and they also show why the latter, while they are definitely helpful for many patients, can scarcely be expected to approximate the real thing any better than they do.

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